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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,081	10/29/2003	Sharon Liu	GP-302997	5946

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EXAMINER

SILVER, DAVID

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 07/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/696,081

Applicant(s)

LIU ET AL.

Examiner

David Silver

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. Claims 1-29 are pending in Instant Application.

#### *Priority*

2. Examiner acknowledges Applicant's claim to priority benefits of Provisional Application 60/455083 filed 03/13/2003.

#### *Information Disclosure Statement*

3. No IDS statement was submitted.
4. The following art reads on the instant invention and provides a publication date of 2003: Liu's "Adjoint-based system identification and feedforward control optimization in automotive powertrain subsystems", 2003 ("Liu"). The document was listed as being published in 2003; however a month of publication was not established. It is noted that the authors of the document are two of the Application's inventors. The Examiner respectfully requests that the Applicants provide, in form of an affidavit, the earliest publication date of the Liu document, otherwise it will be asserted that the document was published prior to Applicants' priority date and will clearly anticipate the claims presented.

#### *Drawings*

5. Figures 2 and 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (**a powertrain system, and torque converted, respectively**). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
6. The drawings are objected to because (**Specification: page 4 lines 20-22**) appears to reference the second step (104), not first step (as disclosed). Specifically, first step does not refer to defining a

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cost function. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and **should not repeat information given in the title**. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

7. The abstract of the disclosure is objected to because **the first sentence recites that which is in the title**. Correction is required. See MPEP § 608.01(b).

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using

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it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

As per claims 10, 20, and 29, the specification does not adequately disclose simulated data. What is "simulated data"?

8. Claims 9, 10, and 12-29 are rejected under 35 U.S.C. 112, second paragraph, as being **indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 9, 10, 12, 19, 20, 22, and 29 recite the limitation " the identified model parameters ". There is insufficient antecedent basis for this limitation in the claim. Furthermore, there is an ambiguity whether these model parameters refer to the parameters being solved for, or parameters being used in the solving, or another set of parameters.

9. The above cited rejections are merely exemplary. The Applicant(s) are respectfully requested to correct all similar errors.

10. Claims not specifically mentioned are rejected by virtue of their dependency.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Thomas R. Bewley's "Adjoint and Raccati: essential tools in the analysis and control of transitional and turbulent flow systems" ("Bewley").

11. As per claim 1, Bewley discloses: A method of identifying unknown model parameters of a non-linear dynamic system model having one or more system inputs, comprising:

determining a governing state equation from the system model (**Slide 10, 5, 7**);

determining a generalized cost function that represents a performance objective for the system

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**(slide 17, 2, 5, 15);**

determining an adjoint equation based at least in part on the governing state equation **(slide 6, 7, 18);**

determining a gradient based at least in part on the adjoint equation **(slide 2, 6, 10, 16);** and  
supplying the governing state equation, the adjoint equation, and the generalized cost function to a processor **(Slide 7 "Solution", slide 9);** and

causing the processor to iteratively determine changes in the generalized cost function that result from incremental changes in arbitrarily chosen values of one or more of the unknown model parameters to thereby identify the unknown model parameters **(slide 10, 21, 25 "centralized computer")**.

As per claim 2, Bewley discloses: The method of claim 1, further comprising:

determining a perturbation state equation based at least in part on the governing state equation **(slide 5, 10, 18, 26);** and

determining a perturbation cost function based at least in part on the perturbation state equation and the generalized cost function, wherein the adjoint equation is determined based at least in part on the perturbation cost function **(slide 18, 5, 10, 26)**.

As per claim 3 Bewley discloses: The method of claim 1, further comprising:

determining one or more initial states for solving the governing state equation **(slide 12 last line "initial conditions")**;

causing the processor to iteratively determine changes in the cost function that result from incremental changes in one or more of the initial states **(slide 10, 25)**.

As per claim 4, Bewley discloses: The method of claim 1, wherein:

the adjoint equation includes one or more adjoint states **(this is an inherent feature of adjoint equations)**; and

the incremental changes are driven by gradients derived from the adjoint states **(middle page 10)**.

As per claim 5, Bewley discloses: The method of claim 1, wherein the processor iteratively determines the

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changes in the cost function until a specified accuracy criterion is met (**slide 2 item 4 "convergence"**).

As per claim 6, Bewley discloses: The method of claim 1, wherein the processor iteratively determines the changes in the cost function until a predetermined number of iterations is completed (**slide 2 item 4 "convergence"**).

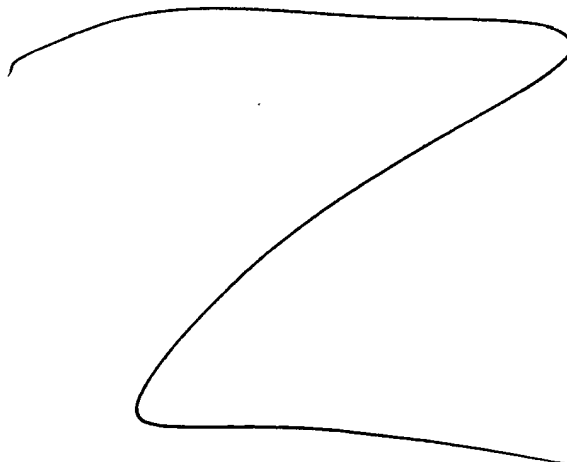
As per claim 7, Bewley discloses: The method of claim 1, further comprising:  
determining the state equation, cost function, adjoint equation, and gradient by supplying one or more exogenous inputs (**slide 25 "sensor measurements, slide 6, 7, 18"**).

As per claim 8, Bewley discloses: The method of claim 1, further comprising:  
determining an adjoint identity, wherein the adjoint equation is additionally determined from the governing state equation (**slide 19 "adjoint identity", 6, 7, 18"**).

As per claim 10, Bewley discloses: The method of claim 1, further comprising:  
validating the non-linear dynamic model using the identified model parameters against one or more sets of simulated data (**slide 10 "linearization changes at each iteration"**).

As per claim(s) 12-13, note the rejection of claim(s) 3 above. The Instant Claim(s) is/are functionally equivalent to the above-rejected claim(s) and is/are therefore rejected under same prior-art teachings.

As per claim(s) 14-18, 19-20, note the rejection of claim(s) 4-8, 9-10 above. The Instant Claim(s) is/are functionally equivalent to the above-rejected claim(s) and is/are therefore rejected under same prior-art teachings.



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***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 9, 19, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over

As per claim 9, Bewley discloses all limitations of claim 1. Bewley however does not expressly disclose validating the non-linear dynamic model using the identified model parameters against one or more sets of experimentally determined data. Official Notice is taken with respect to this limitation. It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to combine the references in order to calibrate the model with the item it is modeling in order to achieve the realistic simulation results.

As per claim(s) 19 and 19, note the rejection of claim(s) 9 above. The Instant Claim(s) is/are functionally equivalent to the above-rejected claim(s) and is/are therefore rejected under same prior-art teachings.

13. Claims 11, and 21-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas R.

Bewley's "Adjoint and Raccati: essential tools in the analysis and control of transitional and turbulent flow systems", further in view of Official Notice taken, further in view of Bewley and Liu's "Optimal and robust control and estimation of linear paths to transition", ("Bewley") and in further view of Ilya Kolmanovsky's "Evaluation of Turbocharger Power Assist System Using Optimal Control Techniques" ("Kolmanovsky").

As per claim 11, Bewley discloses all limitations of claim 1, Bewley however does not expressly disclose that the non-linear dynamic system model includes one or more powertrain system models.



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Kolmanovsky discloses an analogous adjoint based system modeling having the said feature (**page 2 col 2 para 2; page 2 col 2 section titled "Powertrain Model"**). Bewley and Liu appear to be sponsored by GM Powertrain (Transmission Group) (Bewley2 page 347 last paragraph). As such, it would appear that Bewley and Liu would have an interest in developing a system that relates to GM's Powertrain Transmission Group. Furthermore, Bewley provides motivation on (slide 28 "Extension to 2D base flows (e.g., cylinder, ...)"; slide 29).

As per claim(s) 21, note the rejection of claim(s) 11 above. The Instant Claim(s) is/are functionally equivalent to the above-rejected claim(s) and is/are therefore rejected under same prior-art teachings.

As per claim 22, note the rejections of claims 1-3 above. The instant claim is functionally equivalent to the above-rejected claims under section 102 but for the model is not that of an automobile powertrain system. Note the rejection of claim 11 above. The art rejection applied to claim 11 in combination with claims 1-3 creates a functional equivalent to claim 22. Therefore, the instant claim is rejected under same prior art teachings of claims 1-3 and 11 and motivations as presented above.

As per claim(s) 23-29, note the rejection of claim(s) 3-8 and 10 above. The Instant Claims are rejected under same prior-art teachings as the claims above.

### ***Conclusion***

14. All claims are rejected.

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Silver whose telephone number is (571) 272-8634. The examiner can normally be reached on Monday thru Friday, 10am to 6:30pm.

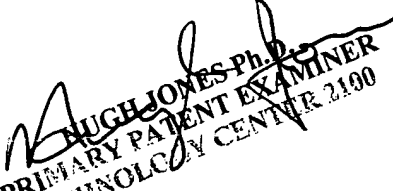
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from

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either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Patent Examiner  
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